FIG. 1

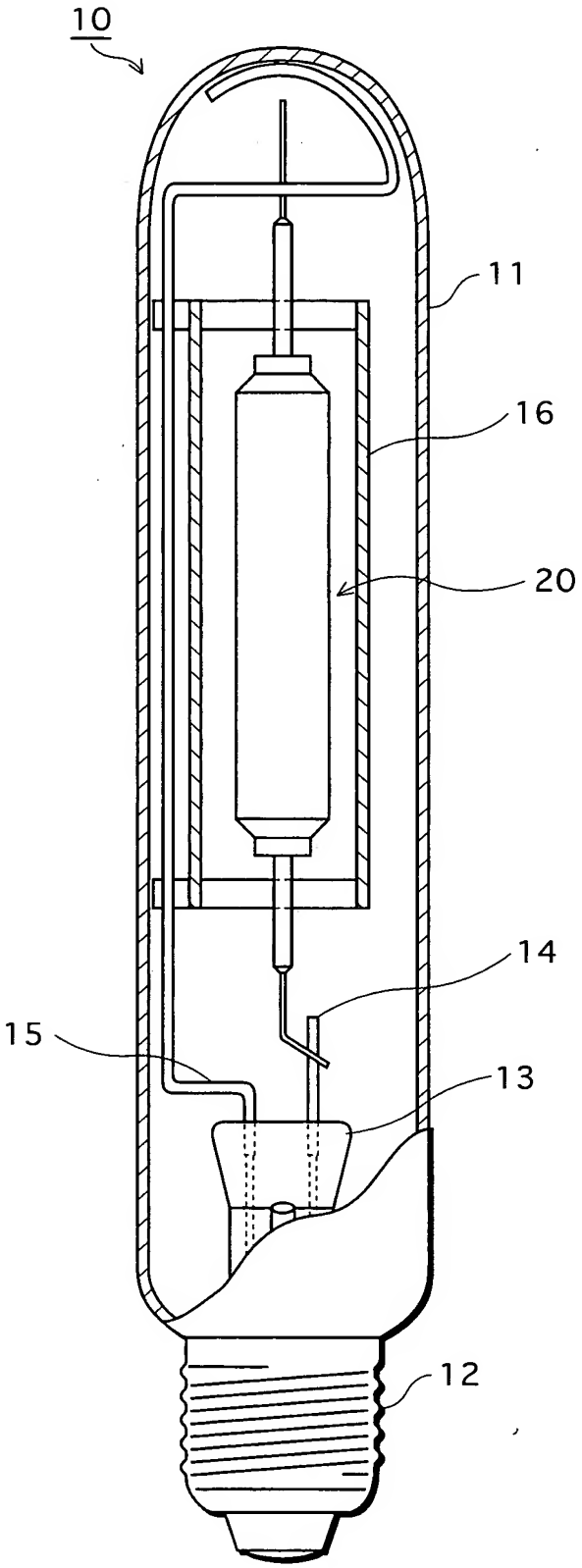

FIG.2

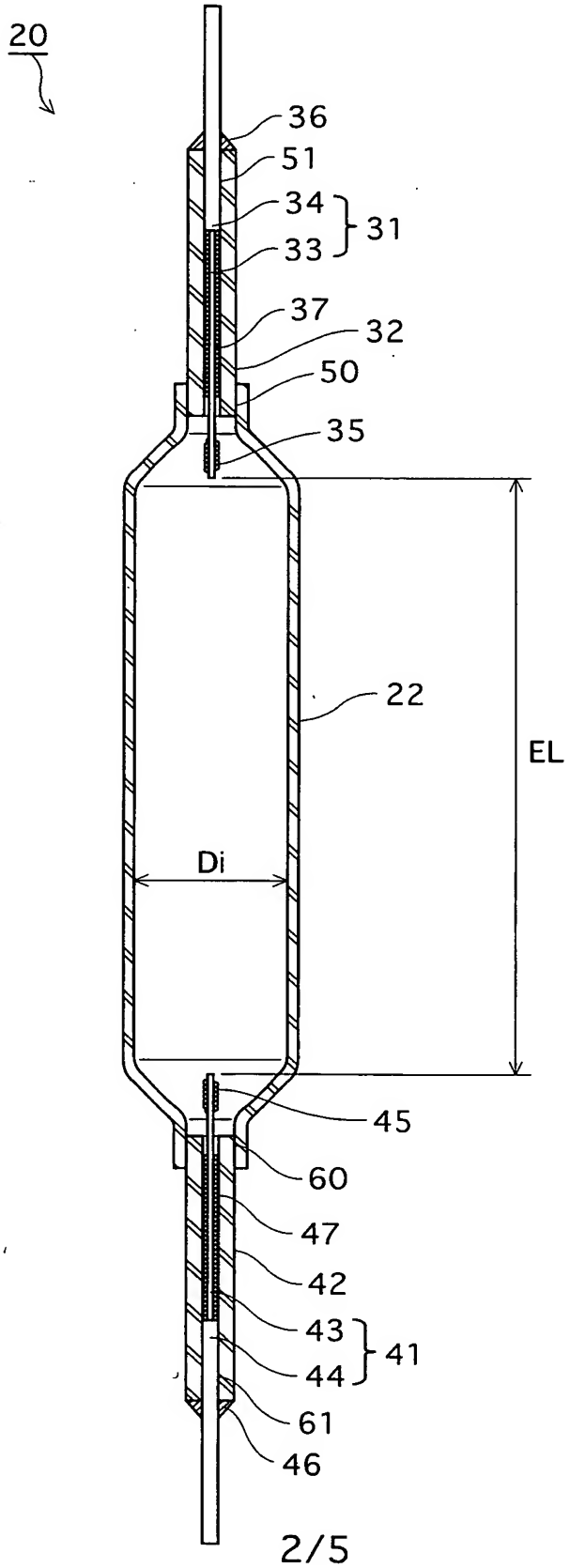

FIG.3

ADDED AMOUNT OF MgO

MgO(ppm)	100	200	300	400	500	700
LUMINOUS FLUX MAINTENANCE FACTOR(%)	75	72	65	62	61	58

FIG.4

RELATIONSHIP BETWEEN CRYSTAL GRAIN DIAMETER AND CRACK PROBABILITY
(TUBE WALL LOADING OF 35W/cm², AND ELAPSED LIGHTING TIME OF 18,000 HOURS)

(1) MAIN TUBE PART'S INNER DIAMETER : 2.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	0.0	0.0	60.0	80.0

(2) MAIN TUBE PART'S INNER DIAMETER : 3.5mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	0.0	0.0	70.0	90.0

(3) MAIN TUBE PART'S INNER DIAMETER : 5.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	0.0	0.0	70.0	90.0

(4) MAIN TUBE PART'S INNER DIAMETER : 7.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	0.0	0.0	75.0	95.0

(5) MAIN TUBE PART'S INNER DIAMETER : 10.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	0.0	0.0	55.0	65.0

FIG.5

RELATIONSHIP BETWEEN CRYSTAL GRAIN DIAMETER AND CRACK PROBABILITY (TUBE WALL LOADING OF 45W/cm², AND ELAPSED LIGHTING TIME OF 18,000 HOURS)

(1) MAIN TUBE PART'S INNER DIAMETER : 2.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	0.0	0.0	80.0	100.0

(2) MAIN TUBE PART'S INNER DIAMETER : 3.5mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	5.0	5.0	90.0	100.0

(3) MAIN TUBE PART'S INNER DIAMETER : 5.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	5.0	10.0	85.0	100.0

(4) MAIN TUBE PART'S INNER DIAMETER : 7.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	10.0	20.0	95.0	100.0

(5) MAIN TUBE PART'S INNER DIAMETER : 10.0mm

CRYSTAL GRAIN DIAMETER(μm)	0.5	1.0	1.5	3.0	5.0	10.0	15.0
CRACK PROBABILITY(%)	0.0	0.0	0.0	0.0	0.0	75.0	95.0